

## TRICKS WITH LOENCO MULTI-PORT VALVES.

LOENCO manufactures a wide variety of gas chromatographic analyzers. The LOENCO multi-port instrument valves are used in many of our instruments to provide our customers with the flexibility required for a wide range of application. The same high quality low dead volume LOENCO valves are available for solving your own application needs.

This information sheet is provided as a means of telling you about a few of the applications which we believe may be of interest to you.

### 1. INTRODUCTION OF A SAMPLE OF ONE STREAM INTO ANOTHER FLOWING STREAM.

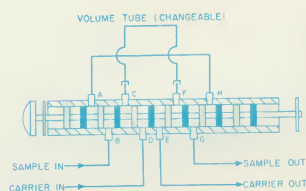
The LOENCO L-208-6V valve is most frequently used for this application because it permits the customer to use a continuous flow sample stream. The sample stream flows in either position of the sample valve, so that the sample line is always presenting a fresh sample to the sample valve. Some types of gas sample valves shut off the sample stream flow during sample introduction. Our L-206-6V valve can be used if it is desired to shut off the sample flow during sample introduction. The diagram below shows how the L-208-6V valve is used for reproducible volume gas sampling.

### 2. SELECTION OF EITHER ONE OF TWO COLUMNS.

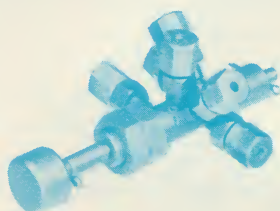
The L-206-6V valve can be used as shown by the diagram below to select either column 1 or column 2 by connecting either one or the other into the carrier gas stream. The column not used is sealed off during its period of inactivity to prevent contamination by the atmosphere.

### 3. PREFRACTIONATION COLUMN WITH COMPENSATED CARRIER GAS FLOW.

The LOENCO L-208-8V is frequently used whenever it is necessary to prefractionate a sample before making a detailed analysis of the lower boiling materials by a second column. The diagram below shows this arrangement. The sample is introduced by either hypodermic or sample valve into the carrier gas stream entering port C or into the carrier gas stream leaving port B. The sample passes to column No. 1 which is the prefractionation column. The more volatile constituents of the sample pass through column 1 and enter the main fractionation column No. 2. At a pre-determined time the switch valve is positioned so that the carrier gas entering port C passes through port D through an adjustable needle valve to port E and out port F to column No. 2. The needle valve is initially adjusted so that the flow resistance of the needle valve equals the flow resistance of column No. 1. This arrangement makes it possible to maintain a constant flow through the analysis carrier flow path so that the flow rate of carrier gas passing to the sample detector remains constant regardless of the valve position. Column No. 1 is backflushed by the passage of carrier gas from port G through the prefractionation column to port B and from port A to the atmosphere. This arrangement is useful in prefractionation of blood gases from blood or for the elimination of higher boiling components from a broad boiling-point range sample.

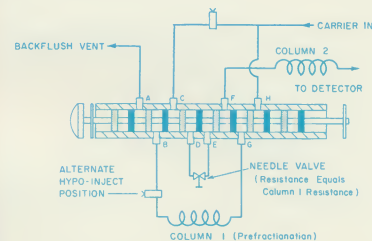


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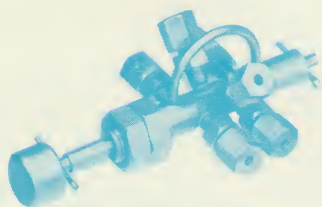


L-206-6

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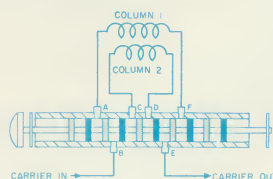


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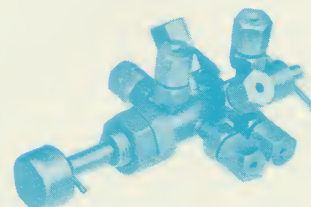


L-208-6

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L-208-8

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#### 4. SWITCH-OUT COLUMN WITH RESTRICTOR FOR COMPENSATED FLOW RESISTANCE.

The L-206-6V valve can be used to switch a downstream or upstream column out of a 2-column system and at the same time introduce a flow restriction by the use of a needle valve so that the needle valve flow restriction equals the column flow restriction. The diagram below shows a typical hook-up. This arrangement is frequently used for the analysis of sample which contain inorganic gases and higher boiling organic gases or liquids. An upstream column is used in this case, and the analysis starts with the valve positioned so that the switch-out column is connected to the flow stream. Let us assume that a sample contains oxygen, nitrogen, carbon dioxide, carbon monoxide, methane and ethane. The upstream column is a silica gel column which will not give a complete separation of the mixture. To separate oxygen and nitrogen, it is necessary to use a molecular sieve packing for column No. 2 which is the switch-out column. The operation is as follows: The sample is introduced and the composite peak of oxygen, nitrogen, and carbon monoxide plus the partially resolved methane peak issuing from the silica gel column passes into the switch-out column. As soon as this has happened, the switch-out valve is positioned so that the carrier gas from the silica gel column bypasses through the needle valve and from the needle valve to the detector. The ethane and carbon dioxide peaks are eluted from the silica gel column and are detected and recorded. As soon as this has happened, the switch-out valve is repositioned to place the switch-out column back into the flow stream. A separation of the trapped components then occurs and the peaks are detected in the following order: oxygen, nitrogen, methane, and carbon monoxide. The use of the L-206-6V valve for column switch-out application can be useful in other similar applications.

#### 5. FLOW REVERSAL THROUGH A COLUMN.

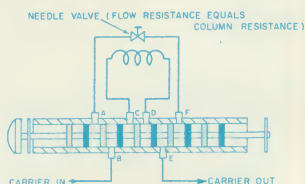
The L-206-4V valve is frequently used as a column reverse valve. It is most frequently used in the following fashion: Assume a mixture of methane, ethane, propane, isobutane, n-butane, isopentane, n-pentane, and a small quantity of hexanes and heptanes. It is desired to obtain a detailed analysis of the methane, ethane, propane, isobutane, and n-butane. It is acceptable to obtain a composite lumping of the pentanes, hexanes, and heptanes. The analysis is initiated by introducing the sample while the flow reverse valve in position No. 1. The separated methane, ethane, propane, isobutane, and n-butane peaks are recorded as individual peaks by normal elution. As soon as these peaks are recorded, the flow reverse valve is positioned to position No. 2, and the carrier gas flow is reversed in the column. This flow reversal reassembles the higher boiling components into a composite peak which is eluted through the sense detector. The total residual quantity can thus be obtained. This same arrangement can of course be used to backflush the residuals from a column whether a measurement of this residual quantity is necessary or not.

#### 6. TWO-COLUMN SWITCHING WITH POSITIONS REVERSED AND FLOW DIRECTION UNALTERED.

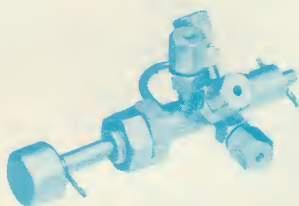
It is possible to use the L-208-6V valve to interpose the positions of 2-columns in series without changing the direction of flow through either of the columns. The diagram below shows how this is accomplished.

Materials are stainless steel for both stem and valve body. Connections are  $\frac{1}{8}$ " Swagelok tube fittings for easy connections. For further information on these valves, refer to LOENCO DATE SHEET LOE-4.

LOENCO Multi-Port Switch Valve have uses which are not shown by the above diagrams. If you have a switching application which requires a solution, please send the problem to us in detail. Special switching arrangements can be obtained by using more than one switch valve. The LOENCO Model 15B-X gas chromatograph can incorporate any of the above column switching arrangements with all of the piping done by LOENCO.

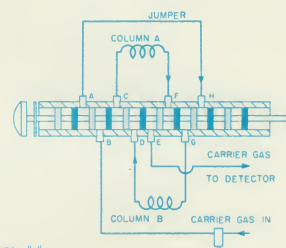


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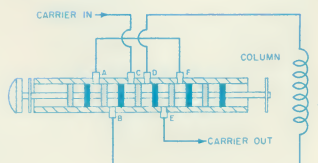
L-206-4

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